stem must be arrested. When the new crop of leaves are mature, they will begin again to throw down large quantities of cell material, and the lining of a new tube will be commenced. During these alternations, different sorts of tissues are necessarily formed, and the markings on a cross section have the appearance of indistinct rings.

The Robinia is another notable example of this. I have laid upon the table a specimen of an eight year old stem, upon which may be counted nine distinct rings and many indistinct ones. It was cut in June, and two distinct rings had already been formed, one made up of the cells that were forming the inner lining of the new tube of wood, and the other made up of the bast cells, forming the new layer of bark. It will be found on a close examination of the section, that the greater vessels are arranged in concentric layers of bundles not in contact, making imperfect or intermediate rings. These bundles are so mingled with the woody tissues as so give the layers in some degree a homogeneous appearance, entirely wanting in most stems.

As has been stated, the accepted theory of Exogenous growth is, that a new tube of wood is annually formed outside the last year's growth. This theory is based upon well authenticated observation, and no theory in Natural History is admissible, unless it is born out of observation and experiment. I do not presume to offer a new one, yet I believe that the old theory will yet undergo great modification, as more light is thrown upon this interesting question. I do not hesitate to say that from my observations I am forced to the conclusion that, as Exogens require a period of activity and a season of rest to form a tube of wood, they may and do form new tubes whenever these conditions sharply succeed each other.

O. R. Willis.

§ 222. **Botanical Directory for 1878.**—Parts I. and II., containing the names and specialties of Botanists, are now ready for distribution. Part III., relating to Libraries, Herbaria, etc., will probably be ready in May, when it will be forwarded to subscribers.

§ 223. **When the Leaves fall.**—Mr. N. L. Britton, of New Dorp, Staten Island, has kindly sent us the following excellent contribution to this subject. Mr. Britton observes that "the female in dioecious plants appears to hold its foliage longer than the male." He has "noticed this very strongly marked in Ailanthus glandulous, Acer saccharinum and A. rubrum, and Salix alba and S. discolor, but not in Populus. Ilex opaca and Kalmia latifolia hold green leaves all winter."

For want of space we have left out two columns of Mr. Britton's tables; the first, for September 29th, when the leaves were all on the plants mentioned except those marked with *, and the last, for November 30th, when all the leaves were off except those marked †. Of the former Cephalanthus had already lost all its leaves, September 29th, the others only a few of them; of the latter, Myrica cerifera still held most of its leaves, November 30th, Quercus palustris had still a good many leaves, the others had still a few, and Baccharis had still some at Christmas.